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Anirudh Shingal

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JEL classification: C23, O11, O53, R12

Key words: Services, India, states, growth, convergence, tradability

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December 2012

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India's success story in services is well documented at the national level, but similar literature does not exist for India's states. In this paper, we bridge this gap in research by looking at India's services growth at the sub-national level and in doing so, also challenge existing literature by arguing that this growth has positive implications for income distribution. We find that even as per capita income is not converging across India's states, per capita services are; evidence is provided both in terms of traditional measures of sigma- and beta-convergence and more recent panel unit root tests. A more disaggregated analysis of services sectors reveals convergence in railways, public administration and financial services. Finally, a Jensen & Kletzer (2005) approach to determining tradability provides evidence of most services being "traded" across India's states, suggesting the role of such trade in the services growth and convergence story.

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1. Introduction

Services have emerged as the largest and fastest-growing sector globally in the last two decades. The sector contributes more than 60 per cent of global output and, in many countries, an even larger share of employment. This growth has also been accompanied by the rising share of services in world transactions, with services trade growing faster than goods trade in the period since 1990. There has also been a perceptible shift of FDI away from manufacturing towards services across the world. The share of services in total FDI stock in 2005 was around 61% compared to 49% in 1990 and only a quarter in the 1970s.

In line with this global trend, the services sector in India has also been witness to rapid growth, especially since the 1990s. In fact, this growth has now led to India becoming an "outlier" in terms of its services sector performance in the years since the turn of this century. Services contributed 52.6% of the country's GDP in 2006, which is higher than the share for countries at a comparable level of per capita income as India; the sector employed 32% of the country's labour force in 2004. Services exports accounted for 38.4% of India's total exports in 2006 (against 20% in 1990) and services trade was 15% of the country's GDP in the same year (up from 3.4% in 1990).

India's services growth has generated a lot of interest among academics and practitioners and there has been considerable research trying to explain the "services revolution" in the country (for e.g. see Hansda, 2002; Gordon & Gupta, 2003; Salgado, 2003; Banga, 2005; Verma, 2006; Eichengreen & Gupta, 2010). However, the sustainability of services-led growth in India has been questioned (for e.g. see Mitra, 1988; Bhattacharya and Mitra, 1990 and Arunachalam & Kumar, 2002). In particular, the lack of a concomitant increase in services employment has been pointed to as the inability of this growth process to draw people away from agriculture with associated implications for income distribution and convergence.

All these studies, however, look at the performance of services at the national level and to the best of our knowledge, there is not much literature exploring the services sector at the sub-national or state level in India[2]. In this paper, we not only bridge this gap in research but also challenge existing literature by suggesting that services growth in India may be equalizing in

[2] Some work has been done by Wu Yanrui (2004), Deepita Chakravarty (2005) and Amin & Mattoo (2008).

the long run. To substantiate our claim, we employ both standard growth regressions from the convergence literature and more recent panel unit root tests to find that per capita services are converging across India's states, even as per capita incomes are not. A more disaggregated analysis of services sectors reveals convergence in railways, public administration and financial services. Finally, we employ Jensen & Kletzer's (2005) approach to examine whether services that exhibit greater convergence over time are also more tradable across states, corroborating our results with an alternative original methodology that, in the absence of actual data, provides estimates of services "trade" flows across Indian states.

The rest of the paper is structured as follows. The next section provides some stylized facts on India's services growth at the sub-national level as a starting point while Section 3 discusses why this is important in the context of results that suggest convergence in per capita services across the states. Section 4 provides a more disaggregated analysis of the services convergence story while Section 5 explores the role of trade. Section 6 concludes.

2. Stylized facts

At the outset, it may be worthwhile to point out that traditionally, 14 of the 28 Indian states have been regarded as "major" states based on their Gross State Domestic Product (GSDP), population, geographical size and location. These major states have been reported with an asterisk against their names in the tables in this paper. These states contribute 70 and 87% of India's GDP and population, respectively, which also means that hypotheses and results for the major states would also be broadly applicable to the whole of India. This is especially useful from a research perspective as data are not always readily available over a longer time period for the non-major states[3].

We begin by looking at the services[4] performance of Indian states in terms of the sector's contribution to value added, employment and the associated growth rates in Table 1.

[3] The non-major states include the "seven sisters" from the North East (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura), the small states of Jammu & Kashmir, Goa, Sikkim and Himachal Pradesh, and the newly formed states of Chhattisgarh, Jharkhand and Uttaranchal (which were hived off from MP, Bihar and UP, respectively, in 2000-01).

[4] Our globally-accepted definition of "services" includes construction; utilities (electricity, gas and water supply); transport, storage and communication; trade; hotels & restaurants; financial services; real estate and business services; public administration; and community, social and personal services. Note however that construction and utilities are a part of "industry" in India's National Accounts Statistics.

<Insert Table 1 here>

Table 1 reveals the importance of the services sector in GSDP across most Indian states. The sector contributes at least half of the state domestic product in both the largest and the smallest states; the latter have also witnessed the highest growth rates in real services value-added. The table also shows the relative less importance of services share in employment across Indian states especially for the major as well as the services-intensive GSDP states (in fact the biggest services employers are the non-largest states). While one can see the growing importance of services over time in general both in terms of GSDP and employment, more striking is the growing importance of services over time for the BIMARU[5] states in general and Bihar in particular over the last decade, especially in GSDP and to a lesser extent in employment. Finally, the top ten richest states (in terms of real per capita income or PCY) also have a higher share of services in GSDP and employment than the rest of the country.

We next consider a disaggregated analysis of services contribution to GSDP and employment across Indian states by sectors for the period 2000-07 by looking at percentage shares and growth rates in Table 2. To enable this analysis, we group the states into four categories: one, high PCY large states (MH, KR, TN, AP, KN, GJ, WB); two, low PCY large states (BH, UP, MP, RJ, OR); three, high PCY medium-sized states (PJ, HR); and four, non-major states.

<Insert Table 2 here>

In general, traditional services such as trade, hotels and restaurants; real estate; and construction services have been the big contributors to services value added over time across the majority of Indian states, so the structure has been fairly similar across space and time. The 1990s witnessed the importance of banking and insurance while communication services have gained significance in the years since 2000, both of which are "non-traditional" services.

If we look at the percentage shares of services value added in Table 2, we see that (apart from CH, JH and PJ) services contribute at least half of the GSDP in each state, irrespective of the

[5] This is a collective term given to the historically poorly-performing states of Bihar, MP, Rajasthan and UP.

level of per capita income, but there are sectoral fluctuations across states. For instance, mostly non-major states exhibit more than average (for India as a whole) shares in construction and utilities. Most of the high PCY large states show greater than average shares in communication; trade, hotels & restaurants; real estate and business; and financial services. The low PCY large states, on the other hand, have above average shares in transport and trading services, the latter being true of PJ & HR as well. *Thus, there seems to be a clear demarcation with transport services especially railways driving demand in low income states; the higher income states focusing on non-traditional services like communication, financial and other business services; and trade, hotels & restaurant services showing importance across the board.*

If we consider growth rates of services value added next and study states and sectors on the basis of "above" and "below" average growth rates for India as a whole, we see that, with the exception of other transport and real estate and business services where the low and high income states, respectively, show above-average growth, the four-fold classification of states by PCY and size does not work as well. For instance, in the case of construction services, UP, RJ as well as MH, WB have experienced above-average growth. In the case of communication and financial services, both UP, OR and the high income states show above-average growth rates. Trading, hotel and restaurant services show UP, BH as well as the high income states with above-average growth rates. *Thus, when it comes to growth rates, one or the other low income state seem to be "catching-up" with the high income states across services sectors.*

The disaggregated analysis of services contribution to employment across Indian states for the period post-2000 suggests that sectorally, *trade/distribution, hotel & restaurants and community, social and personal services have accounted for almost two-thirds of all workforce employed in services and the structure has been fairly similar across all states. Construction and transport, storage and communication services come next but the hierarchy between them has varied across states.* We also see a lot more variation in the share of services in total employment across states compared to that in value added. Also, sectoral variations in employment exist across states; sectors like utilities for instance employ very few people in all states. While no single sector emerges as an above-average (for India as a whole) employer across the low income states, transport, storage and communications; distribution, hotels and restaurants; and financial services show up as above-average

employers across the high income states. In fact, all sectors are above-average employers in PJ and HR. For the non-major states, the big employers are construction, utilities, trading and community, social and personal services.

3. The services convergence story

A review of the literature studying income convergence across Indian states suggests that accounting for differences in methodology, coverage of states and sample size, most studies have found significant income divergence across India's states [Nair (1971), Gupta (1973), Chaudhury (1974), Majumdar & Kapoor (1980), Sarkar (1994), Dholakia (1994), Bajpai & Sachs (1996), Marjit & Mitra (1996), Ghosh et. al. (1998), Rao, Shand & Kalirajan (1999), Dasgupta et. al. (2000), Kurian (2000), Aiyar (2001), Nagaraj et. al. (2002), Sachs et. al. (2002), Bandyopadhyay (2003), Gunji & Nikaido (2010), Kocchar et. al. (2006), Kar & Sakthivel (2007), Misra (2007), Kalra & Sodsriwiboon (2010)][6]. However, with the exception of Dasgupta et. al. (2000) and Kar & Sakthivel[7] (2007), none of these studies has looked at the sectoral pattern of GDP. Is it possible that any particular sector may in fact be showing evidence of convergence?

Using traditional measures of beta- and sigma-convergence from growth literature (Barro & Sala-i-Martin, 1992, 1995), we tested our data for the presence of absolute convergence across the 14 major states[8] and as in the findings above, confirmed the absence of unconditional income convergence. However, interestingly, when we replicated this analysis at the disaggregated level, we found evidence of absolute convergence in per capita services across the 14 major states.

Formally, the estimate of β in $gr^{pcs}_{it} = \alpha + \beta(lnpcs)_{it-1} + \varepsilon_{it}$ where "gr^{pcs}_{it}" is the growth rate of per capita services for state "i" between time "t-1" and "t", gives us the estimated β-convergence for per capita services value added.

[6] A few have however documented the presence of conditional convergence [Aiyar (2001), Nagaraj et. al. (2002), Kocchar et. al. (2006), Purfield (2006), Misra (2007), Kalra & Sodsriwiboon (2010)]. Cashin & Sahay (1996) found absolute convergence but their results lacked statistical significance.

[7] Their analysis does not cover the period since 2000 and the authors show that regional inequality went up in the 1990s largely due to the rising inequality of industry and services in the period.

[8] It is standard practice in this empirical literature to test for convergence across the major states as they account for a substantial share both of India's population and GDP.

The estimated β-convergence for per capita services value added for the 14 major states was -0.0096 ('t' statistic = -1.69) over the period 1980-2006 and -0.016 ('t' statistic = -1.93) over the period 1990-2006. Similar estimates of β-convergence for per capita income, albeit negative, did not report statistical significance over these time periods. Indian agriculture also showed beta-convergence but only during 1990-2006; Indian industry showed divergence over both these time periods.

To calculate sigma-convergence in per capita services value added, we first computed the standard deviation in per capita services value added across states for each year and then estimated the trend in this standard deviation overtime. *Formally, the coefficient σ on t in* $sd^{pcs}_t = \alpha' + \sigma t + \varepsilon_t$ *where "*sd^{pcs}_t*" is the standard deviation in per capita services across the 14 major states at time "t", gives us the estimated σ-convergence for per capita services value added.*

Looking at the major states again, we found the estimated trend to be -0.00003 over 1980-2006 ('t' statistic = -0.03) and -0.005 over 1990-2006 ('t' statistic = -1.98). Per capita income, on the other hand, exhibited sigma-divergence and statistically insignificant sigma-convergence, respectively, over these time periods. Indian agriculture and industry both exhibited statistically insignificant sigma-convergence over 1980-2006 but statistically significant sigma-convergence over 1990-2006.

Recent empirical literature has criticised the use of traditional growth regressions in studying convergence [Friedman (1992), Quah (1993), Evans & Karras (1996), Evans (1998), Temple (1999)] and advocated instead the use of non-stationary panel data econometrics [Quah (1994), Bernard & Jones (1996), Evans & Karras (1996)]. The latter consider the following data generating process:

$$\Delta x_{it} = \mu_i + \rho x_{i,t-1} + \sum_{j=1}^{p} \upsilon_{ij} \Delta x_{i,t-j} + \varepsilon_{it}$$

where $x_{it} = \log y_{it} - (1/N)\sum_i \log y_{it}$ and ε_{it} is IID with mean = 0.

The null hypothesis is H_0: $\rho=0$, that is, all time series are random walks. Under the alternative, it is assumed that all the time series are stationary with H_1: $\rho<0$. If the null of unit

root is rejected, then x_{it} would be mean reverting and any deviations from the cross-sectional average would diminish over time; hence the y_{it} series would be converging[9]. On the other hand, if the unit root tests fail to reject the null hypothesis, then the evidence suggests that these deviations follow random paths thereby rejecting the convergence hypothesis. In view of this, we also decided to use panel unit root tests to test for convergence in per capita services.

Recent studies by O'Connell (1998) and Breitung and Das (2005) have highlighted that, in the presence of contemporaneous correlation, standard panel unit root tests like those proposed by Maddala and Wu (1999); Levin et al. (2002) and Im et al. (2003) suffer from severe oversize problem. We thus first needed to test our series for cross-sectional dependence and then to test them for convergence using different techniques from the literature suitable for our data and sample size.

Using the Modified Lagrange Multiplier test for cross-sectional dependence in Pesaran (2004), we found x_{it} defined on per capita services to be cross-sectionally dependent. The estimated test statistic was 2.65 for the 14 major states over 1980-2006 (p value = 0.0079; average absolute correlation = 0.372) and 5.77 (p value = 0.0000; average absolute correlation = 0.615) over 1990-2006[10].

If cross-sectional dependence is weak, literature suggests using robust panel unit root tests such as the one proposed by Breitung & Das (2005). However, if cross-sectional dependence is strong, estimation requires decomposing the time series into common and idiosyncratic factors and testing them separately for the presence of unit roots (for e.g. Bai & Ng, 2004). Unfortunately, however, there seems to be no consensus in literature on the definition of weak or strong dependence (Sarafidis & Wansbeek, 2012)[11].

In view of the above, the first method used to test for unit roots was the panel unit root test suggested by Breitung & Das (2005) which is robust to weak cross-sectional dependence and

[9] In addition, if $\mu_i = 0$ then this convergence would be absolute.
[10] Similar results for x_{it} defined on per capita income did not report statistically significant cross-sectional dependence.
[11] Pesaran (2007) considers an average correlation coefficient of 0.6 in the cross-section errors in his empirical investigations (pp 25) as indicative of strong cross-sectional dependence. In comparison, our panel of 14 major states over 1980-2006 would seem to report weak cross-sectional dependence.

also has power for small samples; this supported convergence in x_{it} defined on per capita services but not on per capita income [the test statistic λ^* for the 14 major states over 1980-2006 was -1.895 (p value = 0.029) and -1.24 (p value = 0.108) over 1990-2006; similar results for x_{it} defined on per capita income lacked statistical significance].

Under the assumption of strong cross-sectional dependence, we next decided to estimate one common factor in x_{it} defined on each of per capita income and per capita services using principal components analysis on their standardized first differences in line with the procedure outlined in Bai & Ng (2004)[12]. As Bai & Ng (2004) have further shown, the common factor estimated using principal components analysis and the idiosyncratic errors follow the standard Dickey-Fuller (DF) test (with and without intercept, respectively) under the null of unit root. We found both the common factor and the idiosyncratic error to conclusively reject the null of unit root in each case, irrespective of state coverage and sample size, thereby validating the convergence hypothesis. These results are reported in Annex Table A1.

However, in small samples with N and/or T less than 20, such as ours, it is difficult to estimate the common factors and the number of factors accurately (Bai & Ng, 2004; Sul, 2009). We thus decided next to use the cross-sectional demeaned version of the IPS test (CIPS) suggested by Pesaran (2007) which accounts for the dynamics in the common factor by using cross-sectional averages and their lagged values (without having to estimate the common factor first); the unit root test is based on the t-ratio of the OLS estimate of β_i in the cross-sectionally augmented DF regression (CADF) below:

$$\Delta x_{it} = \alpha_i + \beta_i x_{i,t-1} + \gamma_i \bar{x}_{t-1} + \sum_{j=0}^{p} \delta_{ij} \Delta \bar{x}_{t-j} + \sum_{j=1}^{p} \eta_{ij} \Delta x_{i,t-j} + \varepsilon_{it}$$

where p is the order of the AR error process[13] *and* the CIPS test statistic is given by:

$$CIPS = (1/N) \sum_{i=1}^{N} CADF_i$$

The CIPS test loses power for T<20 and we therefore used it to test for convergence across the 14 major states over 1980-2006. In contrast to the results from Bai & Ng (2004) above,

[12] Given the small sample size, the panel criterion developed in Bai & Ng (2002) cannot be used here as N is too small for precise estimation of the number of common factors.

[13] This was found to be one for x_{it} defined on per capita services and two for x_{it} defined on per capita income.

the null of unit root was not rejected by x_{it} defined on either per capita services or per capita income thereby suggesting non-convergence in both per capita services and per capita income[14]. These findings were also supported by the covariate-recursive mean adjusted unit root test of Sul (2009) on the common factor[15] in x_{it} defined on both per capita services and per capita income for the 14 major states over both 1980-2006 and 1990-2006.

In sum, per capita income levels are not converging across India's states based on most empirical results reported above. However, per capita services are found to converge based on results from traditional growth regressions as well as panel unit root tests under the assumption of weak cross-sectional dependence. This finding suggests that the divergence in per capita income over 1980-2006 may be more linked to the country's non-services sectors.

To test this conjecture empirically, we regressed the standard deviation in log of per capita income across the 14 major states (σ^{pcy}_t) on the cross-sectional means of the logs of per capita services ($pcser^m_t$), per capita non-services ($pcagr^m_t$, $pcind^m_t$) and other control variables over 1980-2007 and 1990-2007. The control variables included population (pop^m_t), state-level openness index from Marjit et.al.[16] (2007) as a proxy for trade (lib^m_t) and the share of public expenditure in GSDP ($expd^m_t$) [17].

$$\sigma^{pcy}_t = \alpha + \beta_1 pcser^m_t + \beta_2 pcagr^m_t + \beta_3 pcind^m_t + \beta_4 pcagr^m_t * pcind^m_t + \beta_5 pcagr^m_t * pcser^m_t + \beta_6 pcind^m_t * pcser^m_t + \beta_7 lib^m_t + \beta_8 expd^m_t + \varepsilon_t$$

Estimated β_1 was found to be positive but statistically insignificant (value = 1.1, 't' statistic = 0.88), β_5 to be negative and weakly significant (value = -0.38, 't' statistic = -1.87) and β_6 to be positive and statistically significant (value = 0.12, 't' statistic = 6.3) over 1980-2006. On the other hand, agriculture and industry seemed to have a dampening effect on the divergence in

[14] The computed CIPS test statistics had values of -1.6 and -1.63, respectively.
[15] As Sul (2009) has pointed out, if the null of unit root in the common factor is not rejected, then there is no need to test the hypothesis for the idiosyncratic factors (pp 2).
[16] In the absence of trade data in India at the state level, the authors link the level of output of a specific state to all-India trade figures to get an approximate indicator of how much 'open' it is. If for a specific state most of the production is concentrated in items that contribute largely to export value at the all-India level, then it is reasonable to conclude that the particular state is attuned to exports. Similarly, if a state has high production value of import substitutes, then it must be relying less on imports and hence is not so open.
[17] Unfortunately, data on state-level GFKF were not available for all states to be included as an explanatory variable in this equation. Data on lib^m_t were available from 1980 to 2002 only.

per capita income, though the coefficient on the interaction term between them was found to be positive and statistically significant (value = 0.8, 't' statistic = 3.4).

Interestingly, however, there was a turnaround in these results for the period 1990-2006. While all estimated coefficients except β_8 lacked statistical significance, estimated β_1 was now found to be negative (value = -2.2), while those on agriculture and industry turned positive. In more disaggregated analysis[18], we found results from Breitung & Das (2005) panel unit roots suggesting convergence in financial services (and in railways and public administration). This also adds up with the growing share of this sector in GSDP across states since the 1990s (discussed in Section 2) and suggests that such non-traditional services could be a factor in distributing the benefits of services growth more widely than accepted.

Services growth can thus be an answer to India's income divergence in the long-run if this growth can offset the diverging impact of non-services building on the preponderance of the services sector in the country's GDP and its growing share in the labour force. Support for this proposition can already be found at the micro-level. For instance, recent research has shown that greater labour market opportunities in services cause young women to delay marriage and child-bearing in favour of working (Jensen, 2012). Children growing up near call centres are more likely to be enrolled in primary school (Oster and Millett, 2010). What is more, this makes services growth more politically sustainable than has been hitherto made out. This is also corroborated by the recent economic performance of Bihar; significantly, the state also shows up above the fitted trend line in a scatter plot of services share in GSDP against PCY levels for the 14 major states since 1990 (see Figure 1).

<Insert Figure 1 here>

4. Traditional versus non-traditional services

In this section, we present a more disaggregated analysis of the services convergence story. To understand this better, we delineate services into traditional services such as construction, transport, real estate, hotel & restaurants, utility and distribution; and non-traditional services

[18] These results are discussed in the next section.

such as business including IT & IT-enabled, financial and telecom because the convergence story is likely to be different for these two categories.

Results from traditional beta- and sigma-convergence tests, reported in Tables 3 and 4, provided no evidence of convergence across the 14 major states over time for any individual category of service. Only financial services suggested statistically insignificant beta-convergence over 1980-2006; on the other hand, most of the traditional services reported statistically significant beta-divergence and all categories reported statistically significant sigma-divergence.

<Insert Tables 3 & 4 here>

However, when we used the panel unit root test suggested by Breitung & Das (2005), this supported convergence in railways, financial services and public administration over 1980-2006; all other categories reported statistically insignificant convergence in the presence of a linear trend. The results are reported in Table 5.

<Insert Table 5 here>

While the role of traditional services such railways (important in low PCY states) and public administration (especially important in non-major states) in the services convergence story is perhaps more acceptable, what is significant is the role of non-traditional financial services in spreading the benefits of this growth more widely than accepted, especially since it is the high PCY states are the dominant players in this category. Once again, this is a finding that is contrary to perceived wisdom.

5. The role of trade

Literature suggests that exports have contributed almost 25% to the growth of services value added in India over time (Eichengreen & Gupta, 2010); the share of services exports in GDP has risen from 3% in 1990 to 15% in 2006. This suggests that the tradability of services across states must also be an important feature of the growth and convergence story at the sub-national level.

Unfortunately, trade data are unavailable in India at the sub-national level. However, the analysis in Section 2 reveals that there is enough variation in services employment and demand across sectors, which in line with Jensen & Kletzer (2005), provides evidence for tradability of services across states. Following them therefore, in this section, we calculate indices of economic concentration of sectors across Indian states that hint at tradability and examine whether services that exhibit greater convergence over time are also more tradable across states.

The basic idea of Jensen & Kletzer (2005) stems from the economic intuition that non-tradables tend to be more ubiquitously distributed as opposed to tradables that exhibit geographic concentration in production to benefit from increasing returns to scale, access to inputs, etc.

Geographic concentration, which compares a region's share of employment in or output of an activity with the region's share of overall economic activity, can be calculated in a number of ways. However, measures of concentration do not differentiate amongst the reasons for concentration; they just indicate that the location of production is distinct from the location of consumption. However, if a service is non-tradable but the demand for it is concentrated, then the service will also be geographically concentrated, leading one to infer incorrectly that the service is tradable. Thus, tradability can be more correctly deduced as long as production is more concentrated than demand.

In keeping with this, we construct **state and sector-specific measures of demand ($D_{i,s}$)** for each sector 'i' and state 's,' using input-output (I-O) transaction flow tables from the Central Statistical Organization (CSO) for the year 2003-04. This measure is calculated using both intermediate and final demand (private final consumption expenditure, government final consumption expenditure and gross capital formation) flows.

Formally,

$$D_{i,s} = \sum_j \left[\frac{Y_{i,j}}{Y_i} \times \frac{emp_{j,s}}{emp_j} \right]$$

where

$Y_{i,j}$ = Output of (services) sector "i" used by (all) sector " j" (including components of final demand as "sectors")

Y_i = Total output of sector "i" (including components of final demand)

$Emp_{j,s}$ = (Services) Sector "j" employment in state "s"

Emp_j = Total employment in (services) sector "j"

The first measure of economic concentration from this literature[19] is:

$$EC_i = \sum_s ABS(S_{i,s} - SS_s)$$

This measure is an index for comparing a state's share of sectoral employment ($S_{i,s}$) with the state's share of aggregate employment (SS_s). When a state's employment share in any services sector is significantly greater than its share of aggregate employment, this is indicative of the state's concentration or specialization in the concerned sector, in turn suggesting tradability.

To incorporate demand more formally into this framework, the EC measure is modified to look at the difference between a state's share of sectoral employment and its share of sectoral demand, thus:

$$\mathrm{EC}^{\mathrm{mod}}{}_i = \sum_s ABS(S_{i,s} - D_{i,s})$$

In line with Jensen & Kletzer (2005), $\mathrm{EC}^{\mathrm{mod}}$ "thus provides a national index for each sector, and measures of EC indicating geographic concentration are interpreted as indicative of trade in that activity, in the sense that local employment exceeds "local" demand in some areas and the difference is traded outside the area."

Figure 2 shows the calculated indices for 25 states and six broad categories of services - Utilities (Electricity, Gas & Water supply); Construction; Distribution, Hotels & Restaurants; Transport, Storage & Communication; Financial Services; and Community, Social and Personal Services. Since the input output transaction flows were taken for 2003-04, the employment and value added data also correspond to this period.

<Insert Figure 2 here>

[19] Ellison and Glaeser (1997) used the square of the differences between Si,s and SSs in the formula above. However, as Spiezia (2002) notes, this makes the measure sensitive to the level of aggregation of regional data and hence, he advocates using the absolute value of the differences instead.

The main observation from Figure 2 relates to the extremely small magnitudes of EC_i for all sectors. Looking at the supply side alone, utilities (index value of 0.58) and financial services (value of 0.38) seem to have a more concentrated employment pattern and hence suggest more tradability than other services categories. However, once we incorporate demand into the framework, the values of EC^{mod}_i suggest tradability across states for all sectors, especially construction (index value of 0.94), community, social & personal (value of 0.92) and distribution services (0.83) but also transport (0.76) and financial services (0.61). Significantly, both railways and financial services also report convergence across states in the analysis undertaken in the preceding section; they are also amongst the fastest growing sectors in terms of value added since 2000 (see Table 2).

Finally, states where a significant share of the GSDP emanates in the more tradable sectors would *ipso facto* suggest more trade-intensiveness for the state on the whole. For instance, the share of services value added in GSDP exceeds the corresponding average value for India in at least three of the four more tradable sectors (construction, distribution, financial and transport) for six of the fourteen major states – Tamil Nadu, Kerala, Karnataka, Maharashtra, Haryana and West Bengal. We would thus expect these states to be more trade-intensive too.

5.1. Robustness check

As a robustness check, we use I-O data from the CSO for 2003-04 to construct a vector of aggregate services usage by state and sector, which is then subtracted from services output to yield a production minus demand vector for each state and sector. Where this difference is positive, it indicates that the particular service is exported and that the given state is a net exporter of that particular service. This methodology has hitherto not been used in the literature in this area and in the absence of actual trade data at the sub-national level, provides original estimates of "trade" flows at the state-sector level.

Formally,

$$T_{i,\,p} = \left[S_{i,\,p} - \sum_{j} \left\{ \left(\frac{Y_{i,\,j}}{Y_j} \right) \times Y_{j,\,p} \right\} \right]$$

where

$T_{i,p}$ *= Production minus demand vector for services sector i and state p*

$S_{i,p}$ = *Services value added for sector i and state p*

$Y_{i,j}$ = *Output of (services) sector i used by sector j (including components of final demand as "sectors") at the national level*

Y_j = *Total output of sector j (including final demand as a "sector") at the national level*

$Y_{j,p}$ = *Total output of sector j at the state level (including final demand as a "sector")*

In using this methodology, we make two restrictive but unavoidable assumptions. Firstly, given that data on sectoral input output flows are not available at the state level we use national level information, which amounts to assuming that there are no regional variations in sectoral input-output flows across India. Secondly, given that data on final demand are not available at the state level, we use the ratio of final demand to output at the national level to infer final demand at the state level, which thus assumes that the final demand to output ratio is constant across states.

With these caveats in mind, we report the results of this methodology in Table 6. Each observation is the difference between production of and demand for a services sector at the state level. Where this difference is positive, it indicates that the particular service is exported and that the given state is a net exporter of that particular service. Taking the aggregate across columns reported at the end yields the total across services sectors for any state and if this total is positive, it indicates that the particular state is a net exporter of services on the whole.

<Insert Table 6 here>

Looking at these results, we observe that 19 of the 28 states are net exporters; 10 of the 14 major states are net exporters (while Gujarat, Haryana, Orissa and Punjab are net importers). Maharashtra, Tamil Nadu, West Bengal, Karnataka and Kerala are amongst the largest traders with Maharashtra leading the way with net services export of INR 25.8 mn. Significantly, these results corroborate those from using the Jensen & Kletzer (2005) methodology as the top five traders (those with services "trade" in excess of INR 10 mn) are also identified as amongst the most trade-intensive states using the Jensen & Kletzer (2005) methodology.

Finally, results from this methodology also suggest that construction; other transport; trade, hotel & restaurant; real estate & OBS; and financial services were the more "traded" sectors

in 2003-04. The presence of financial services in this list is significant as the sector also reported convergence across states in the results in Section 4. Moreover, construction, other transport and trade have also been amongst the largest contributors to both services value added and employment over 2000-2007 (see Table 2).

6. Conclusion

The analysis in this paper confirms that India's states mirror the growth story of the country's services sector at the national level. Critics of this growth process, however, claim that it is not sustainable. Our results, however, suggest that per capita services are converging across states and time, which makes this growth both progressive and politically sustainable. The economic performance of Bihar is a case in point.

At the moment, convergence in services is not resulting in convergence in income due to the offsetting impact of divergence in industry and the concentration of the labour force in agriculture. However, with services growth adding further to services share in GDP and employing a greater share of the country's labour force, this growth is bound to have positive implications for income distribution. Moreover, services growth is not restricted to sectors where concentration effects are more pronounced, but is equally visible in traditional sectors like construction, distribution, transport and tourism, where the benefits from the growth process are more widely distributed. The human capital skill requirements are less intense in such sectors and the growth process would therefore involve a greater share of the labour force over time, drawing people away from agriculture. This said, our analysis also suggests that a non-traditional sector like financial services may also be witnessing equalizing growth across India's states, which is a significant finding.

Finally, in line with literature documenting the role of trade in India's services growth story, the statistical analysis in this paper demonstrates the tradability of services sectors at the sub-national level. All this coupled with India's current small share in global trade and its increasingly important role as a global services exporter also point to the potential for more services-export led growth going ahead. Significantly, in light of our results on convergence, such growth could also be equalizing, which bodes well for the country's future, even from a political economy perspective.

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Figure 1: Scatter plot of services share in GSDP against real PCY levels for major states

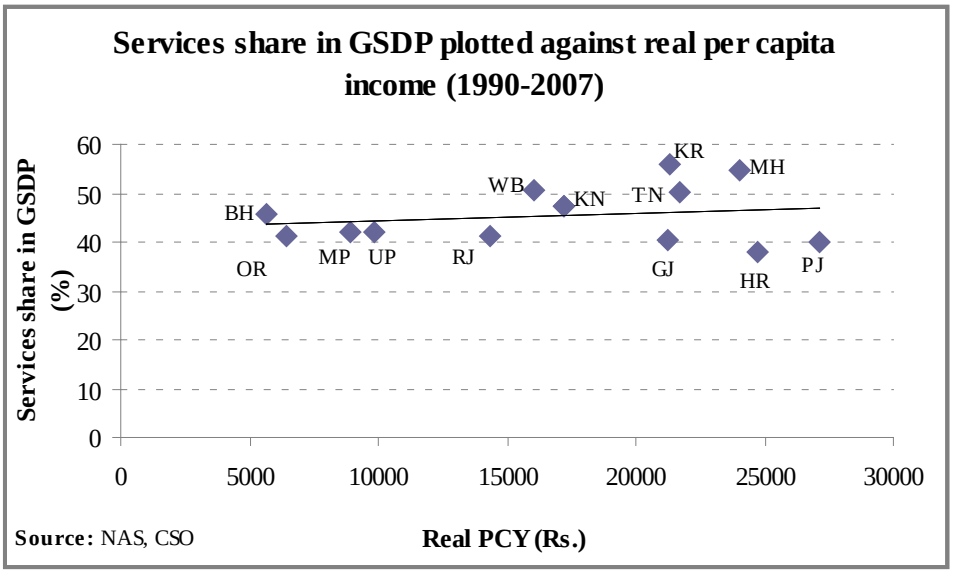
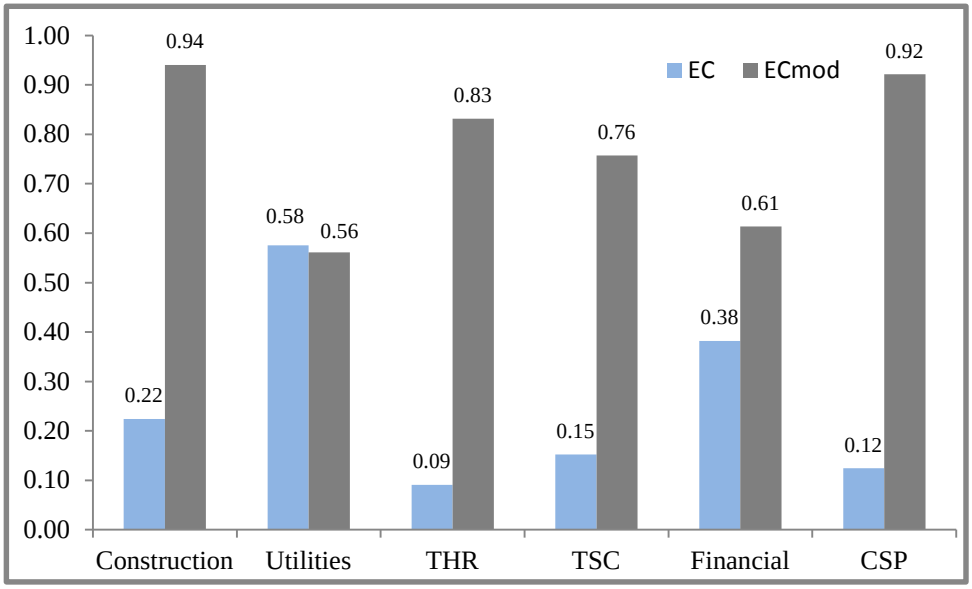


Figure 2: Economic concentration indices for services sectors, 2003-04



Note: THR = Trade, hotels and restaurants; TSC = Transport, storage and communication services; CSP = Community, social and personal services

Table 1: A snapshot of India's states

State	Population (mn)			Real per capita income (Indian Rupees)			Services share in real GSDP (%)			Growth rate of real services value-added (%)			Services share in employment (%)			Growth rate of services employment (%)	
	1980-90	1990-2000	2000-07	1980-90	1990-2000	2000-07	1980-90	1990-2000	2000-07	1980-90	1990-2000	2000-07	Avg. 1983, 88	1994	Avg. 2000, 04	1994/80s	2000s/94
Uttar Pradesh* (UP)	122.1	150.2	173.3	5006	8916	11291	35.5	38.6	44.7	5.6	4.8	6.0	21.8	24.8	29.0	35.2	*33.3*
Maharashtra* (MH)	68.9	86.2	100.2	*13512*	*21510*	*28163*	*43.9*	*50.4*	*58.7*	5.9	*7.5*	*8.5*	*24.9*	29.6	*35.3*	*43.1*	*33.3*
Bihar* (BH)	76.5	94.6	87.1	4168	4534	7264	30.7	36.1	*54.8*	5.8	4.7	6.2	17.2	19.0	21.1	32.9	30.2
West Bengal* (WB)	59.7	73.4	82.4	9791	13768	19790	*44.6*	*47.5*	*53.5*	4.5	7.4	7.6	*29.7*	33.1	*34.9*	*37.4*	20.3
Andhra Pradesh* (AP)	58.6	71.0	78.6	9865	14398	21157	*39.0*	*44.3*	*49.6*	6.6	6.4	*8.5*	22.3	24.1	30.5	*39.9*	28.2
Tamil Nadu* (TN)	51.6	58.6	63.8	*13144*	*19422*	*24937*	35.7	*43.4*	*56.8*	6.3	*8.5*	7.1	*28.5*	30.6	*34.4*	26.2	19.0
Madhya Pradesh* (MP)	57.5	88.5	62.9	5864	6368	13208	32.7	35.5	*49.6*	5.0	6.2	5.0	15.2	17.4	22.3	*37.6*	*38.7*
Rajasthan* (RJ)	38.3	48.8	59.6	8711	13031	16152	36.0	39.7	42.9	*8.1*	*8.0*	7.1	24.2	28.5	*31.2*	*37.2*	21.4
Karnataka* (KN)	40.5	48.4	54.3	9619	14678	21477	*37.1*	*43.4*	*51.1*	6.3	*8.9*	8.0	22.2	23.9	27.7	34.3	*30.0*
Gujarat* (GJ)	37.2	44.7	52.5	*12183*	*18723*	*25337*	30.4	32.0	37.6	6.9	*8.7*	*9.5*	*26.9*	26.7	30.2	17.7	*37.5*
Orissa* (OR)	28.4	33.8	37.6	4944	5819	7424	29.9	37.4	45.1	6.3	5.5	7.9	20.2	19.4	24.0	12.6	27.1
Kerala* (KR)	27.0	30.3	32.7	*11856*	*17670*	*26547*	*47.8*	*51.5*	*59.4*	3.5	7.1	*9.2*	*36.0*	41.9	*50.5*	35.7	*28.8*
Jharkhand (JH)			28.2			14281			38.3			6.6			29.1		
Assam (AS)		24.9	27.4		1559	1807	36.3	*42.1*	48.1	4.5	3.8	6.4	*25.9*	26.1	*31.7*	25.8	*56.3*
Punjab* (PJ)	18.1	21.9	25.6	*18740*	*24760*	*30486*	*37.6*	36.9	42.5	4.0	5.7	6.0	*32.7*	40.2	*44.8*	*45.6*	*35.2*
Haryana* (HY)	14.3	18.2	22.0	*16137*	*21981*	*29325*	29.2	33.3	41.9	5.8	6.4	*10.7*	*29.1*	44.3	*41.5*	*76.6*	21.2
Chattisgarh (CH)			21.6			6090			39.2			7.1			20.5		
Jammu & Kashmir (JK)		9.1	10.6		14854	16570	36.9	*42.5*	46.4			4.4	*34.7*	46.7	*40.8*	*69.9*	12.7
Uttaranchal (UT)			8.8			19657			*49.8*			*9.9*			*33.9*		
Himachal Pradesh (HP)		5.7	6.4		*20434*	*28531*	34.8	36.7	38.0	5.3	*7.5*	8.0	18.2	27.0	*33.3*	*81.2*	*28.9*
Tripura (TR)		3.1	3.2		7077	10949		*54.5*	*52.8*		*10.4*	*11.4*	*54.8*	52.4	*57.2*	29.3	19.8
Manipur (MA)		2.1	2.4		12761	16452	*42.3*	*48.6*	43.1		6.6	*13.4*	*26.9*	35.7	30.6	*73.8*	4.5
Meghalaya (ME)		2.1	2.4		14318	19071	*46.7*	*53.0*	*51.3*			6.5	20.5	20.4	21.7	*67.5*	-3.6
Nagaland (NA)		1.6	2.2		16266	18407		*59.4*	*53.9*		3.8	7.8	*85.6*	46.0	*40.6*	-49.8	*67.4*
Goa (GO)		1.3	1.5		*38950*	*49331*	*48.5*	*50.4*	47.1	6.6	*7.8*	*9.2*	*49.3*	60.4	*64.6*	*66.9*	6.9
Arunachal Pradesh (AR)		1.0	1.1		9750	11009	32.6	38.2	44.0	*8.0*	*7.7*	*10.4*	*60.9*	19.6	22.9	-45.5	-7.1
Mizoram (MZ)			0.9		*18083*	20071		*61.4*	*64.4*			7.3	21.6	23.8	*31.8*	*45.8*	*60.0*
Sikkim (SI)		0.5	0.6		10142	13033		*48.8*	*52.1*		*10.4*	8.4	*32.0*	40.9	*43.6*	*71.8*	25.4
ALL INDIA	**748**	**919**	**1072**	**11785**	**16310**	**22243**	**36.9**	**41.9**	**48.3**	**7.1**	**7.4**	**8.4**	**24.4**	**27.3**	**31.1**	**35.8**	**28.7**

Source: National Account Statistics, CSO; National Sample Survey Organization; various years. (Own calculations**)**

Note: (1) * indicates the 14 major states (2) The table is sorted by descending order of population by state over 2000-07 (3) Figures exceeding the all-India numbers are italicised (4) For the new states of CH, JH and UT, the employment data is only for the year 2004.

Table 2: Sectoral breakdown of services contribution to GSDP and employment by state (2000-07)

	~~Svs VA (% share of GSDP)~~~~~~~~~~~~~~~~~~~~~~~~~~~~										~~~~~~~~~~~~~~~~~~~~~~~~~~~Svs VA growth rates (%)~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~										~~~~~Svs emp (% share of total emp)~~~~~~					
State	**Constrn**	**Uts**	**Rlys**	**Other trans**	**Comm**	**Trade, H&R**	**FS**	**RE & bus.**	**PubAd**	**Others**	**Constrn**	**Uts**	**Rlys**	**Other trans**	**Comm**	**Trade, H&R**	**FS**	**RE & bus.**	**PubAd**	**Others**	**Constrn**	**Uts**	**TSC**	**Trade, H&R**	**FS**	**CSP**
UP*	5.5	*3.9*	*1.8*	*4.3*	2.2	12.3	3.8	6.9	*5.4*	8.0	*14.0*	*20.6*	15.0	*22.1*	*38.1*	*12.4*	*14.3*	*16.5*	*16.0*	*19.7*	5.8	0.2	4.0	*11.0*	1.1	8.6
MH*	5.2	2.6	0.7	*5.2*	*3.4*	*15.6*	*11.6*	*10.8*	4.2	7.4	*30.5*	-0.1	4.8	6.6	11.8	5.0	*10.6*	3.7	2.6	1.4	4.9	0.4	*5.4*	*11.2*	*2.8*	10.5
BH*	4.7	1.1	*3.1*	2.5	1.7	*18.4*	3.9	4.0	*6.9*	*14.1*	8.9	-1.2	14.4	*12.4*	12.1	*8.4*	7.5	4.4	*8.9*	3.6	3.1	0.2	2.6	8.8	0.7	6.2
WB*	5.7	1.8	*1.4*	*4.8*	2.0	*15.2*	*6.2*	*9.0*	*5.2*	*9.7*	*13.1*	8.7	5.6	6.4	15.6	6.4	3.3	*11.7*	3.8	5.4	4.2	0.3	*5.8*	*13.2*	*1.8*	10.0
AP*	6.3	*2.5*	*1.5*	*4.6*	*2.8*	13.4	4.7	*8.4*	4.7	*9.7*	8.7	3.9	6.2	8.5	*23.6*	*7.4*	8.6	*8.4*	4.8	*6.7*	4.9	0.2	*4.4*	9.9	1.4	9.7
TN*	*7.3*	1.8	1.1	*5.9*	*3.4*	*16.3*	*7.6*	7.6	*5.1*	*9.8*	*31.5*	*40.7*	4.4	5.5	17.8	2.3	*12.3*	*12.9*	*9.1*	*6.5*	5.9	0.3	*4.9*	*11.6*	*2.5*	9.5
MP*	*6.8*	*3.2*	*2.5*	3.0	1.9	*15.4*	4.2	7.7	4.7	*10.2*	7.1	*10.7*	5.0	6.3	16.7	6.0	9.2	2.8	4.9	3.1	3.9	0.2	2.3	7.9	0.8	7.7
RJ*	*10.6*	*3.8*	*1.4*	2.9	*2.3*	13.2	3.7	6.8	4.1	8.2	*12.0*	2.1	8.9	6.5	19.8	3.4	8.7	4.4	3.0	2.6	*10.6*	0.5	3.6	8.0	1.3	8.0
KN*	*7.3*	*2.6*	0.6	*4.1*	*2.9*	12.8	*6.3*	*12.2*	4.4	8.0	6.2	5.3	11.5	7.1	*24.2*	*8.6*	8.6	*9.6*	3.1	3.5	4.0	0.2	3.6	10.1	*1.9*	7.8
GJ*	5.6	*2.8*	0.8	*4.5*	*2.7*	*14.6*	5.8	5.5	3.4	5.9	10.9	7.2	7.2	8.1	*22.0*	*11.9*	5.1	2.3	-1.0	3.7	4.7	0.3	*4.5*	*10.8*	1.3	8.2
OR*	4.4	*2.8*	*3.1*	*5.2*	*2.9*	10.3	5.1	5.3	*5.4*	7.7	-1.7	9.7	8.2	*11.3*	*27.4*	*7.2*	*12.9*	3.7	1.7	3.5	5.8	0.3	2.8	8.4	1.0	7.3
KR*	*10.7*	2.0	0.5	*7.2*	*3.7*	*20.1*	5.6	*9.1*	4.9	8.3	10.3	8.0	8.4	*10.3*	*24.2*	4.1	*10.5*	*9.5*	*9.1*	3.9	*11.6*	0.4	*8.4*	*15.8*	*3.2*	*12.8*
JH	*6.2*	1.9	*3.1*	2.7	2.0	9.8	2.2	4.5	*5.3*	8.3	4.3	6.0	6.1	3.3	14.6	*7.3*	7.4	*7.0*	*18.5*	4.0	*10.8*	0.3	3.6	9.0	1.3	6.0
AS	5.5	1.5	*1.8*	3.2	1.6	13.1	3.4	3.4	*6.1*	*15.5*	10.3	*16.8*	8.2	6.3	7.3	*7.6*	6.8	*7.6*	3.3	4.3	2.8	0.3	3.8	*11.3*	0.7	*15.9*
PJ*	5.6	*3.2*				12.9	4.9	4.5	4.8	8.6	10.7	2.7				5.3	6.7	3.0	3.1	3.2	*9.1*	*1.3*	*6.5*	*14.4*	*1.9*	*13.0*
HR*	*9.2*	1.5	*1.2*	*5.3*	1.7	*16.5*	3.6	3.8	3.0	6.8	*12.1*	7.2	9.3	*13.3*	*25.4*	*12.9*	6.5	5.5	5.2	6.1	*8.9*	*0.9*	*5.6*	*14.0*	*1.9*	11.6
CH	4.2	*3.9*	*2.0*	2.8	1.5	11.0	2.6	5.8	4.2	*9.1*	*13.3*	-3.2	5.9	*11.6*	14.7	*11.4*	6.4	6.4	*8.2*	*25.5*	4.8	0.1	*8.8*		*10.0*	
JK	*10.6*	*7.4*		*4.2*		7.3	4.2	6.7	*13.9*	*10.1*	8.5	-0.4		*11.3*		3.6	7.7	2.8	0.0	*7.6*	*11.2*	*1.2*	*4.5*	9.8	0.7	*15.4*
UT	*10.6*	*3.2*	*1.6*	*4.6*	1.9	*16.1*	3.4	5.5	*5.8*	*10.8*	*18.9*	*24.1*	5.9	*12.1*	17.5	*8.0*	7.6	4.2	*8.7*	*8.9*	*8.2*	0.5	3.8	*11.4*	1.3	11.8
HP	*19.0*	*6.2*		2.9		9.2	4.3	4.6	*6.2*	*9.9*	7.0	*13.5*	6.5	*10.7*	1.6	*7.5*	*13.0*	3.0	4.1	4.7	*12.7*	*2.0*	3.7	5.0	0.9	10.1
TR	*19.1*	2.3		3.2	*4.4*	12.0	2.3	3.0	*14.5*	*13.4*	*14.3*	*18.6*	*16.5*	5.3	*59.7*	5.6	*13.9*	3.8	*6.6*	2.2	*9.6*	0.1	3.4	*13.3*	0.4	*30.5*
MA	*22.8*	*3.3*		1.7	1.0	7.7	1.8	3.0	*14.7*	*12.1*	1.6	2.0	3.6	5.2	1.0	*13.2*	*11.7*	*12.1*	*8.3*	*13.9*	3.0	0.0	2.7	8.6	0.5	*16.5*
ME	*9.9*	*3.7*		*5.6*	1.6	9.8	3.1	*9.5*	*13.4*	8.3	7.8	3.9		9.1		*9.1*	5.9	*9.6*	3.3	4.6	2.5	0.3	1.6	6.5	0.2	11.8
NA	*10.7*	1.5	0.1	*13.9*	1.4	5.3	1.4	*10.6*	*13.9*	8.3	*13.0*	*11.3*	*14.9*	6.9	16.2	*10.4*	*18.2*	*11.9*	*7.6*	*6.6*	2.3	*1.0*	1.9	*10.9*	0.5	*25.6*
GO	5.4	2.1	0.4	*12.3*	0.8	10.2	*8.3*	6.3	4.4	4.4	3.2	9.8	8.8	*15.4*	18.3	-4.1	7.8	5.3	-1.1	5.3	*13.5*	*1.3*	*13.2*	*21.4*	*2.7*	*15.5*
AR	*19.7*	*5.4*		2.9	*2.2*	5.7	2.5	2.8	*16.1*	*11.5*	*24.2*	*44.7*	*158.7*	4.6	9.6	6.3	6.9	4.0	*7.2*	5.5	4.7	*0.7*	0.4	4.4	0.5	12.3
MZ	*11.2*	*4.4*		1.6	0.7	7.9	3.0	*15.8*	*21.2*	*13.9*	9.5	6.5	*17.1*	*12.7*	15.0	-0.2	*14.8*	*9.2*	*11.2*	3.3	3.4	0.0	1.4	8.5	0.6	*18.1*
SI	*17.4*	*5.7*		*4.1*		5.1	3.1	6.6	*18.0*	*15.1*	5.3	1.2		*14.3*		6.4	6.9	*8.9*	4.3	5.8	5.8	*1.9*	3.4	10.0	0.6	*19.7*
Average	**6.7**	**2.7**	**1.5**	**4.6**	**2.2**	**14.4**	**5.9**	**7.7**	**4.9**	**8.8**	**11.3**	**10.0**	**15.0**	**9.4**	**18.9**	**6.9**	**9.3**	**6.9**	**5.9**	**6.3**	**6.5**	**0.5**	**4.3**	**10.6**	**1.6**	**12.6**

Source: National Account Statistics, CSO; National Sample Survey Organization; own calculations

Note: (1) The employment shares are averages of data in 2000 and 2004 except for CH, JH and UT where data is only for 2004 (2) * indicates the 14 major states (3) The table is sorted by descending order of population by state over 2000-07 (4) Figures exceeding the average numbers are italicised (5) Sectors read left to right as follows: Construction; Utilities; Railways; Other transport; Communications; Trade, Hotels & Restaurants; Financial Services; Real estate & business; and Public Administration. "TSC" stands for Transport, Storage & Communications and "CSP" for Community, Social & Personal Services.

Table 3: Sector-wise estimates of β-convergence

Sector	1980-2006	1990-2006
Construction	0.035***	0.035**
	(4.69)	(3.24)
Utilities	0.007	0.12
	(0.85)	(1.03)
TSC	0.14***	0.14*
	(3.74)	(2.42)
Railways	0.0095	0.14
	(1.35)	(1.29)
Other transport	0.005	0.007
	(1.17)	(1.11)
Storage	0.055	0.055
	(1.07)	(1.07)
Communication	0.027***	0.15*
	(6.5)	(2.26)
Financial services	-0.03	0.009
	(-0.72)	(1.27)
Trade, hotel & restaurants	0.11*	0.15*
	(2.12)	(2.04)
Real estate & business	0.17***	0.2***
	(4.93)	(3.94)
Public administration	0.004	0.017*
	(0.66)	(1.98)
Other services	0.006	0.009
	(1.06)	(1.01)

Note: (1) Table reports estimates of β-convergence for the 14 major states for each services category over time (2) Figures in brackets are the values from the 't' test (3) Levels of statistical significance: *5%, **1%, ***0.1% (4) TSC = Transport, storage and communication services

Table 4: Sector-wise estimates of σ-convergence

Sector	1980-2006	1990-2006
Construction	1.04***	1.5***
	(49.9)	(33.5)
Utilities	0.82***	0.9***
	(147.8)	(107.8)
TSC	2.4***	3.4***
	(68.6)	(101.7)
Railways	0.24***	0.34***
	(58.2)	(48.1)
Other transport	1.34***	1.6***
	(114.1)	(93.2)
Storage	0.005***	0.005***
	(9.2)	(9.2)

Communication	0.98***	1.7***
	(43.3)	(68.9)
Financial services	3.6***	4.5***
	(73.5)	(60.7)
Trade, hotel & restaurants	3.7***	5.1***
	(62.8)	(52.8)
Real estate & business	2.3***	3.6***
	(44.3)	(43.7)
Public administration	1.1***	1.6***
	(87.5)	(69.8)
Other services	1.8***	2.4***
	(78.4)	(103.2)

Note: (1) Table reports estimated trend of standard deviation across the 14 major states for each services category over time (2) Figures in brackets are the values from the 't' test (3) Levels of statistical significance: *5%, **1%, ***0.1% (4) TSC = Transport, storage and communication services

Table 5: Sector-wise results of panel unit-root tests

Sector	**1980-2006**		**1990-2006**	
	Without Trend	With Trend	Without Trend	With Trend
Construction	-0.87	-1.09	-0.95	-1.4
	(0.19)	(0.14)	(0.17)	(0.08)
Utilities	-1.37	-0.99	-0.67	-1.3
	(0.085)	(0.16)	(0.25)	(0.095)
TSC	0.53	-1.1	0.46	-0.74
	(0.7)	(0.14)	(0.68)	(0.23)
Railways	-3.12****	-3.4***	-2.9***	-3.3***
	(0.0009)	(0.0003)	(0.002)	(0.0004)
Other transport	-0.7	-0.98	-0.4	-0.24
	(0.24)	(0.16)	(0.34)	(0.4)
Communication	1.22	-0.86	0.35	-1.4
	(0.89)	(0.195)	(0.64)	(0.078)
Financial services	-2.5***	-2.98***	-2.0*	-1.7*
	(0.007)	(0.0015)	(0.02)	(0.04)
Trade, hotel & restaurants	-0.5	-1.6*	-0.9	-1.1
	(0.3)	(0.05)	(0.18)	(0.13)
Real estate & business	1.2	-0.4	0.95	-0.6
	(0.88)	(0.34)	(0.82)	(0.27)
Public administration	-2.25**	-2.4***	-1.6	-1.5
	(0.012)	(0.009)	(0.06)	(0.06)
Other services	0.37	-1.1	-0.6	-1.2
	(0.64)	(0.14)	(0.28)	(0.12)

Note: (1) Table reports test statistics (λ) for the Breitung & Das (2005) panel unit root tests (2) Figures in brackets are the p-values for the associated test statistics (3) Levels of statistical significance: *5%, **1%, ***0.1% (4) TSC = Transport, storage and communication services

Table 1: Estimates of services trade across sectors and states (INR mn, 2003-04)

States	Construction	Utilities	Railways	Other transport	Storage	Communication	THR	Financial	RE & OBS	Others	PubAd	All services
AP*	-7.4	-0.9	0.8	-4.5	-0.1	1.0	4.6	1.7	-4.2	13.3	1.3	5.4
AR	0.2	0.0	0.0	-0.1	0.0	0.0	-0.2	0.0	-0.2	0.2	0.3	0.1
AS	-1.9	-0.4	0.4	-1.7	0.0	0.0	1.2	-0.1	-3.1	5.7	1.0	1.1
BH*	-3.6	-0.9	1.4	-2.7	-0.1	0.0	5.4	0.3	-3.8	7.5	2.2	5.7
CH	-2.1	0.1	0.3	-1.6	0.0	0.0	0.3	-0.3	-1.7	2.7	0.0	-2.5
GJ*	-7.2	-0.8	-0.4	-4.7	-0.1	1.0	5.2	2.3	-7.9	6.4	-0.9	-7.1
GO	-0.4	0.0	0.0	0.3	0.0	-0.1	-0.1	0.3	-0.4	0.2	0.0	-0.2
HP	1.5	0.5	-0.2	-0.9	0.0	-0.2	-0.3	0.0	-1.0	1.5	0.4	1.3
HR*	-0.9	-0.8	0.2	-1.6	-0.1	0.1	3.3	-0.2	-4.6	3.7	-0.7	-1.5
JH	-1.3	-0.4	0.8	-1.7	0.0	0.1	-0.2	-0.4	-2.1	2.0	1.0	-2.0
JK	0.0	0.7	-0.2	-0.5	0.0	-0.2	-0.7	0.1	-0.9	1.7	1.7	1.6
KN*	-3.5	-0.5	-0.4	-3.5	-0.1	1.0	3.7	3.0	2.0	8.1	0.9	10.8
KR*	0.3	-0.7	-0.3	-0.9	-0.1	1.0	8.9	1.2	-1.1	6.0	0.5	14.8
MA	0.2	0.0	0.0	-0.2	0.0	0.0	-0.1	0.0	-0.2	0.4	0.4	0.5
ME	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	-0.1	0.3	0.4	0.4
MH*	-16.8	-1.4	-0.8	-6.9	-0.2	2.3	12.1	20.1	-0.8	17.8	0.4	25.8
MP*	-3.6	0.0	1.2	-4.0	-0.1	0.1	3.4	0.4	-3.0	7.2	0.1	1.6
MZ	0.0	0.0	0.0	-0.1	0.0	0.0	-0.1	0.0	0.1	0.2	0.4	0.6
NA	0.0	0.0	0.0	0.3	0.0	0.0	-0.3	-0.1	0.0	0.3	0.4	0.6
OR*	-3.7	-0.2	0.5	-1.6	0.0	0.1	-1.3	0.2	-3.3	1.7	-0.3	-7.9
PJ*	-3.8	0.7	-0.7	-5.4	-0.1	-0.8	1.9	1.0	-4.6	5.6	0.8	-5.4
RJ*	0.0	0.4	0.4	-4.7	-0.1	0.4	2.6	-0.2	-3.7	6.6	0.2	2.0
SI	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	0.1	0.1	0.0
TN*	-4.6	-2.0	0.2	-2.5	-0.1	1.6	9.4	5.5	-5.0	12.2	1.6	16.3
TR	0.1	0.0	-0.1	-0.3	0.0	0.1	-0.2	-0.1	-0.5	0.4	0.3	-0.1
UP*	-9.9	1.2	1.6	-5.9	-0.1	0.8	3.2	0.7	-7.2	13.1	3.9	1.3
UT	-0.1	0.0	0.1	-0.5	0.0	0.0	0.9	-0.1	-0.9	1.7	0.4	1.5
WB*	-7.6	-1.3	0.8	-4.0	-0.1	0.4	7.8	3.4	-2.7	14.1	1.6	12.3
All states	-76.3	-6.6	5.4	-59.7	-1.5	8.7	70.1	38.6	-61.0	140.6	18.5	76.9

Source: National Account Statistics, CSO; own calculations
Note: (1) * indicates the 14 major states (2) "THR" = Trade, Hotels & Restaurants; "RE" = Real Estate and "OBS" = Other Business Services.

Table A1: Results from unit root tests on common factor and error

Sample coverage	Xit defined on:	Variation in Xit explained by common factor (%)	ADF on common factor	ADF on error	DFGLS on common factor	Comment
			z(t)	z(t)	Test statistic	
Major states, 1980-2006	PCY	26.3	-8.9	-9.2	-9.1	C
Major states, 1980-2006	PCSER	46	-5.4	-5.6	-5.6	C
Major states, 1990-2006	PCY	33.7	-4.9	-5.1	-5.5	C
Major states, 1990-2006	PCSER	61	-4.0	-4.2	-4.3	C

Note: (1) Optimal lag length from Ng-Perron for all tests was 0 (2) 'C' stands for convergence (3) ADF critical values for all samples at 1, 5 and 10% were -3.75, -3.0 and -2.63, respectively (4) DFGLS critical values at 1, 5 and 10% were: -3.77, -3.45 and -3.1 for major states over 1980-2006; and -3.77, -3.64 and -3.2 over 1990-2006.